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EPA Superfund
Record of Decision:

BEULAH LANDFILL
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RECORD OF DECISION SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

BEULAH LANDFILL SITE
PENSACOLA, ESCAMBIA COUNTY, FLORIDA

Prepared by:
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia

RECORD OF DECISION

Declaration

SITE NAME AND LOCATION

Beulah Landfill Site
Escambia County
Pensacola, Florida

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the U.S. Environmental Protection Agency's (EPA) selected Remedial Action (RA) for the Beulah Landfill Site. This final ROD was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, asamended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, 42 U.S.C. 9601 et seq., and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Section 105 of CERCLA), 40 CFR, Part 300. This ROD is based on the Beulah Landfill Site Administrative Record.

The State of Florida, as represented by the Florida Department of Environmental Protection (FDEP), has been the support agency during the Remedial Investigation for the Site. In accordance with 40 CFR 300.430, as the support agency, FDEP has provided input during this process and although a formal letter of concurrence has not yet been received, concurrence is expected.

ROD EXPLANATION

A Remedial Investigation was performed by Potentially Responsible Parties (PRPs) under an Administrative Order on Consent (AOC). The EPA used information obtained in the RI to develop a Baseline Risk Assessment. The Baseline Risk Assessment evaluated the risk associated with a current trespasser scenario. For this scenario, an acceptable risk level of 10[-6] exists. Outside of the Baseline Risk Assessment, a single groundwater contaminant, Pentachlorophenol (PCP), exists in one of the on-site wells (MW -6) above the Maximum Contaminant Level (MCL). The contaminant appears to be isolated to the immediate area surrounding MW-6.

DESCRIPTION OF THE SELECTED REMEDY

The Baseline Risk Assessment and the comparison of exposure concentrations to chemical-specific standards indicates that there is no unacceptable risk to human health or the environment at the Site. Therefore, no action is necessary to ensure the protection of human health or the environment. However, the groundwater will be monitored to ensure that this no action remains protective of human health or the environment.

The EPA understands that the Site will be closed by the State of Florida in accordance with the Florida Administrative Code: Chapter 17-701, Solid Waste Management Facilities.

DECLARATION STATEMENT

The EPA has determined that no action is necessary to ensure the protection of human health or the environment. The five year review will apply to this action because groundwater monitoring will be performed. The EPA has determined that, with the exception of groundwater monitoring, its response at this Site is complete. Therefore, the Site now qualifies for inclusion on the Construction Completion List.

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PENSACOLA, ESCAMBIA COUNTY, FLORIDA

1.0 INTRODUCTION

This Record of Decision (ROD) presents the selected remedial alternative for the Beulah Landfill Site. This ROD was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and to the extent practicable, the National Contingency Plan (NCP). This ROD is based on the Beulah Landfill Site Administrative Record.

2.0 SITE LOCATION

The Site is about 10 miles northwest of Pensacola (Figure 1). Access to the Site is north on Jamesville Road from Mobile Highway (U.S. Highway 90) at a point about 5 miles southeast of its intersection with Nine Mile Road (U.S. Highway 90A). The Site is divided into a north side and a south side by Coffee Creek (Figure 2). Coffee Creek drains to Eleven Mile Creek, which drains to Perdido Bay.

3.0 PHYSICAL DESCRIPTION

Topographically, the Site is located on the W1/2NW1/4 and a portion of the E1/2NW1/4 of Section 15, T.1S., R31W., Tallahassee Base Line in southern Escambia County, Florida.

The Site is approximately 101.9 acres in size. The Site is relatively flat with steeper slopes next to the creeks. Site elevations range from about 65 feet National Geodetic Vertical Datum (NGVD) to about 25 feet NGVD. The area surrounding the Site is heavily wooded and relatively undeveloped. The Site is heavily vegetated with a thick understory of shrubs and a rapidly developing canopy.

4.0 OPERATION HISTORY

The Site was operated as a landfill between the years of 1966 to 1984. The Site is made up of two sections (northern-half and southern-half).

(Northern-Half)

The northern half of the Site is a closed landfill. During its operation, only solid wastes were accepted. Depths of the wastes range from 4 to 10 feet in the northwest section, increasing to 25 to 30 feet in the northeast section. The wastes are covered with 4 to 6 inches of native soil.

(Southern-Half)

The southern half of the Site was a borrow pit for sand prior to 1965. Solid wastes were initially deposited in the southwest corner of the borrow pit to depths of 15 to 20 feet. The disposal cells moved to the east as the landfill matured, and increased in depth to about 35 feet. Coffee Creek was gradually moved north to its present position along the Gulf Power/Telephone Line easement. In 1968, the first domestic septage and wastewater treatment sludges were deposited in a 10-acre excavated and bermed area at the southwest corner of the Site. Initial deposition rates were about 5,000 gallons per day (gpd). The first sludge holding pond was filled in 1976 with construction and demolition debris, and solid waste, and then covered with a minimum of 12 inches of on-site soil. The eastern-most 20-acre sludge pit

was constructed in November, 1977 in a diked area on the Site. Liquid wastes were deposited in the diked area on a previous fill of solid wastes. The solid wastes absorbed much of the liquid, creating a semi-solid spongy surface that persists to the present. All sludge disposal ceased in June, 1984. The final deposition rates were about 20,000 gpd. The former ponds are currently covered with grass and shrubs. No soil cover was placed on the sludges after disposal ceased.

5.0 ENFORCEMENT HISTORY

In 1982, a Site Investigation was performed by Ecology and Environment, Inc. In 1985, the EPA performed a Preliminary Assessment of the Site. In 1988, the Site was proposed for the National Priorities List (NPL). In 1990, the NPL proposal was finalized.

In 1990, the EPA performed a search for Potentially Responsible Parties (PRPs). Following a review of the PRP search list, on March 30, 1991, pursuant to Section 107(a) of the CERCLA, 42 U.S.C. S 9607(a) as amended, the EPA sent 104(e) General Notice (information request) letters to the PRPs. Following a review of the information supplied, on May 20, 1991, pursuant to Section 122(e) of CERCLA, 42 U.S.C. S 9622(e), the EPA sent Special Notice letters to a number of the PRPs.

On May 20, 1991, the EPA entered into negotiations with the PRP group to perform a Remedial Investigation/Feasibility Study (RI/FS). On September 16, 1991, the EPA signed a RI/FS Administrative Order on Consent (AOC) with the PRP group.

6.0 COMMUNITY PARTICIPATION HIGHLIGHTS

In accordance with CERCLA Sections 113 (k)(2)(B)(i-v) and 117 requirements, a Community Relations Plan (CRP) for the site was developed by the EPA. The CRP outlines citizen involvement and the community's concern.

On April 21, 1992, the EPA conducted a RI kick-off meeting in Pensacola, Florida. At the meeting, the public was informed of scheduled RI activities and of EPA's general involvement with the site. Response from the community was very positive.

On August 5, 1993, the EPA published a notice in the newspaper (Pensacola News Journal) notifying the public of the EPA's upcoming Proposed Plan Public Meeting, the availability of the AR and the 30 day public comment period (August 7, 1993 to September 7, 1993). In addition, the EPA mailed a Proposed Plan Fact Sheet to those citizens on the CRP mailing list.

On August 7, 1993, the RI and Risk Assessment documents along with the Proposed Plan were made available to the public. Locally, the documents are available at the information repository at the George Stone Vocational School Media Center (2400 Longleaf Drive, Pensacola, Florida). Regionally, the documents are available at the EPA Region IV Records Center (345 Courtland Street, Atlanta, Georgia).

On August 17, 1993, a Public Meeting was held at the George Stone Vocational School to discuss the RI, Risk Assessment and the Proposed Plan. At this meeting, representatives from the EPA and the Agency for Toxic Substances and Disease Registry (ATSDR) were present to answer questions and address community concerns.

Responses to comments received during the public comment period were incorporated into a Responsiveness Summary (Appendix A).

7.0 SCOPE AND ROLE OF RECORD OF DECISION

The RI characterizes the extent and magnitude of contamination at the Site. The Baseline Risk Assessment utilizes data found in the RI to identify present or future risks to the public health and the environment. The Proposed Plan informs the public of the EPA's preferred Remedial Action (RA) alternative prior to the ROD. The ROD summarizes the RI and Baseline Risk Assessment documents and identifies the selected RA alternative along with addressing comments which were received during the public comment period.

The RI and Baseline Risk Assessment documents were finalized under both State and Federal review. This ROD is considered to be the first and final action for the Site.

8.0 PHYSICAL CHARACTERIZATION

The Site is physically characterized by its geology, surface water flow and groundwater aquifer. As part of the characterization, regional and site-specific information are provided.

8.1 Geology

(Regional)

The Pensacola area is underlain by sands, silts, clays, and limestones of Mesozoic to Cenozoic age. The area lies on the north flank of the Gulf Coast Sedimentary Basin and the east flank of the Mississippi Embayment. This results in a regional soutwestward dip and gulf-ward thickening of most formations down to the basal Cretaceous deposits.

In central Escambia County, Pleistocene terrace deposits and the Citronelle Formation extend from land surface to 300-400 feet below the surface. Underlying the Citronelle Formation are Miocene coarse clastics. Underlying the Miocene clastics is the Pensacola Clay. Underlying the Pensacola Clay is the Chickasaway Limestone. Underlying the Chickasaway Limestone is the Bicatunna Clay Member of the Byran Formation. Underlying the Byran Formation is the Ocala Limestone. Underlying the Ocala Limestone is the Lisbon Equivalent. Underlying the Lisbon Equivalent is the Tallahatta Formation and the Hatchetigbee Formation.

(Site-Specific)

The dominant lithology of the Site is quartz sand (Citronelle Formation) overlain by Pleistocene terrace deposits. A stiff, red clay and white variegated kaolinitic clay exists at 10 to 14 feet below land surface. Clayey sands exist at 100 to 120 feet below land surface.

8.2 Surface Water Flow

(Regional)

The Pensacola area lies on the Gulf of Mexico Coastal Plain, an area with abundant natural precipitation. Surface water drainages are numerous and upland areas that are more than 0.5 miles from surface streams are uncommon. In the Florida Panhandle, virtually all surface water flow is south towards the Gulf of Mexico.

The master drainage for the Site is Eleven Mile Creek, which drains directly into Perdido Bay. Perdido Bay is a saltwater bay, connected to the Gulf of Mexico by Perdido Pass.

Eleven Mile Creek, above the Site, drains an area of approximately 23 square miles. The headwaters of Eleven Mile Creek are about 5.5 miles north of the Site, just west of the town of Cantonment.

Coffee Creek, which bisects the Site and is a tributary to Eleven Mile Creek, drains an area of about 5 square miles. Coffee Creek follows a general southeasterly drainage course from its headwaters, which are located approximately 3 miles northwest of the site. The lowermost reach of Coffee Creek was diverted to its present location by the landfill operators during the active period of operations.

(Site-Specific)

In Eleven Mile Creek, a classic sand channel morphology of channel and slip-off slope was noted. Coffee Creek lacks the discharge needed to establish this streambed morphology and has a relatively flat bottom of uniform depth. In both streams, bottom sediments are comprised of medium to fine quartz sand with traces of muscovite mica. Localized deposits of fine gravel were noted and moderate amounts of woody debris occur in each stream.

All groundwater elevations in the shallow wells at the Site are higher than the corresponding surface water elevations in the adjacent streams. This indicates that groundwater west of Eleven Mile Creek in the site area is discharging to the creek.

8.3 Groundwater Aquifer

(Regional)

Regional geological formations are grouped into six hydrogeologic units (aquifers and confining beds) based on lithology and permeability. In the northern half of Escambia County, fresh groundwater is found in both the Sand-and-Gravel Aquifer and the Upper Floridan Aquifer. However, in southern Escambia County the principal supply of fresh groundwater is in the Sand-and-Gravel Aquifer. In southern Escambia County the Floridan aquifer is saline.

The Sand-and-Gravel Aquifer is composed of three principal zones, the surficial zone, the low permeability zone and the main producing zone. The surficial zone is generally under water table (unconfined) conditions and is primarily composed of fine silt, sand and clay. The low permeability zone is predominantly clay and silt. Water in the main producing zone is nearly always under confined or semi-confined conditions consisting mostly of quartz grains.

(Site-Specific)

In the northern-half of the Site, groundwater enters the Site from the west, flows easterly and southerly beneath the former landfill cells and discharges to Eleven Mile Creek and Coffee Creek. The horizontal gradient through most of the Site is low (0.0044 foot/foot) (Figure 3).

In the southern-half of the Site, groundwater enters the Site along the southwest margin, flows eastward and northward and discharges into Eleven Mile Creek and Coffee Creek. The horizontal gradient is lower than that of the northern-half (0.0035 foot/foot) (Figure 3).

9.0 REMEDIAL INVESTIGATION

A Work Plan was developed for the Site using the EPA guidance: Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites (EPA/540/P-91/001: February, 1991). In accordance with the guidance, the RI was "streamlined". In streamlining the RI, the primary focus of the RI was to characterize the Site by identifying "hot spots" and collecting the necessary information to be used in the EPA's Baseline Risk Assessment. The Work Plan included a Sampling and Analysis Plan and Quality Assurance/Quality Control (QA/QC) Plan.

The PRP's contractor (Engineering Science, Inc.) performed the RI with "oversight" of field

operations by the EPA's contractor (Bechtel Environmental, Inc.).

The RI samples were taken from various media across the Site at a number of locations (Figure 4). In accordance with the Work Plan, RI sampling was performed (first sampling round). The Work Plan was "addended" afterwards to allow for additional sampling (second sampling round).

9.1 First Sampling Round

The first sampling round included sampling of the following media: surface soil/sludge (dried) in the southern "uncapped" portion of the Site (SB-1 through SB-28), sediment from both Coffee Creek and Eleven-Mile Creek (SD-1 through SD-8), surface water from both Coffee Creek and Eleven-Mile Creek (SW-1 through SW-8), groundwater from on-site perimeter monitor wells (BM-1 through BMW-7 and MW-2 through MW-6) and air from temporary locations south (Stations 1 and 2 (QA/QC)) and north (Stations 3 through 5) of the Site.

All media sampled were analyzed for Target Compound List/Target

Analyte List (TCL/TAL) including Pesticides and Polychlorinated Byphenyls (PCBs).

9.2 Second Sampling Round

The second sampling round included "re-sampling" of the following media: surface soil/sludge (SB-3, SB-5, SB-17, SB-18, SB-22 and SB-27), sediment (SD-1, SD-3, SD-6, SD-7 and SD-8), surface water (SW-1, SW-3, SW-6, SW-7 and SW-8) and groundwater (BMW-1, BMW-2, BMW-3, BMW-5, BMW-6, BMW-7, MW-3i, MW-5 and MW-6). In addition, new temporary wells (TW-1, TW-2 and TW-3) were installed and sampled south of MW-6. The temporary wells were installed to determine whether contaminants found in MW-6 were migrating off-site.

The surface soil/sludges were re-sampled for Pesticides and PCBs because the laboratory holding times for these were exceeded in nearly all of samples in the first sampling round. Rather than re-sampling every first sampling round location, a limited number of locations were chosen. The surfacesoil/sludge location (SB-27) was also re-sampled for the full TCL/TAL analytes and Polychlorinated Dibenzondioxins and Dibenzofurans (PCDD/PCDF), calculated in Total Equivalency Quotient (TEQ) values. Sediment and surface water were also re-sampled for Pesticides and PCBs because the laboratory holding times for these were exceeded in the first sampling round. In addition, sediment and surface water were re-sampled for cyanide.

The groundwater was re-sampled for Pesticides and PCBs, as well because the holding times for these were exceeded in the first sampling round. The groundwater location (BMW-5) was re-sampled for lead. The groundwater location (MW-6) was re-sampled, and the temporary well locations were sampled for the first time for Pesticides, PCBs and the TCL.

9.3 Sampling Results

A range of organic and inorganic contaminants were found in all media sampled (Appendix B). The RI groundwater data reflects both filtered and un-filtered inorganics data. However, in accordance with the EPA Region IV policy, only the un-filtered data was used in the development of the Baseline Risk Assessment.

Contaminants found in groundwater above Maximum Contaminant Levels (MCLs) are as follows:

Beryllium

Beryllium occurs in three of the on-site wells (MW-3d, BMW-3 and MW-6) at "un-filtered"

concentrations of 1.1 ppb, 1.6 ppb and 1.2-1.8 ppb, respectively. It occurs at levels slightly higher than the Federal Proposed MCL (1 ppb). It should be noted that these are J "estimated" levels which may not represent "actual" conditions at the Site. Since the levels are so close to the Federal Proposed MCL, Beryllium is not considered to be a contaminant of concern.

Pentachlorophenol (PCP)

Pentachlorophenol (PCP) occurs in one of the on-site wells (MW-6) at concentrations of 120-130 ppb. It occurs at levels much higher than the Federal MCL (1 ppb) therefore, PCP is considered to be a contaminant of concern.

10.0 BASELINE RISK ASSESSMENT

The Baseline Risk Assessment provides the basis for taking action and indicates the exposure pathways that need to be addressed by the RA. It serves as the baseline, indicating what risks could exist if no action was taken at the site. This section of the ROD summarizes the results of the Baseline Risk Assessment conducted for the Site. The components of the Baseline Risk Assessment include a Summary of Site Risk (Contaminants of Concern, and Fate and Transport Analysis), Human Health and Environmental Risk (Exposure Assessment, Toxicity Assessment and Risk Characterization).

The EPA's contractor (Roy F. Weston) developed the Baseline Risk Assessment using information obtained in the RI.

10.1 Site Risk Summary

The assessment of risk posed by the Site was evaluated in a site specific Baseline Risk Assessment dated July 1993 (USEPA Contract Number 68W9-0057). This assessment examined the concentration, properties, and environmental fate and transport of the contaminants associated with various media at the Site as well as the populations and environments potentially at risk. The risks associated with the Site were calculated based on current and future exposure scenarios. The numerical carcinogenic (cancer) risk values are theoretical quantifications of the excess lifetime carcinogenic risk, that is, the increased probability of contracting cancer as a result of exposure to Site wastes, compared to the probability if no exposure occurred. For example, a 10[-6] excess carcinogenic risk represents an exposure that could result in one extra cancer case per million people exposed. The 10[-6] risk level is considered the goal for remediation at Superfund Sites [40 CFR 300.430 (e)(2)(i)(A)(2)].

Though there are no known currently complete exposure pathways, a trespasser scenario was developed to be protective. The resulting current scenario's carcinogenic risk equalled 4.5 x 10[-6] while the total noncarcinogenic HI equalled 0.36. There were no residents in the immediate vicinity of the Site (i.e., hydrologically downgradient). Therefore, the regional risk managers have determined that the trespasser scenario is the most likely future use for the Site.

10.1.1 Contaminants of Concern

In choosing the contaminants of concern for groundwater, consideration is given to factors such as, "any available site background data, disposal history (and records, if available), types of remedial actions being considered, on-site and off-site chemical analysis data and site characterization data necessary for exposure assessment" (Chapter 3, "Superfund Public Health Evaluation Manual" EPA/540/1-86/060, OSWER Directive 9285.4-1, December 1989 and "Risk Assessment Guidance for Superfund" EPA/540/1-89/002).

The list of contaminants of concern for all media is included (Appendix C: Table 1). Other contaminants were discounted as contaminants of concern for various reasons (i.e., concentrations of contaminants that are similar to area/regional background concentration and thus were not considered site-related, concentrations that are of low prevalence/occurrence, or concentrations that were laboratory analysis related).

The surface soils were found to be contaminated with low levels of volatile organic compounds (VOCs), semi-VOCs, metals, and Pesticides. Surface water and sediments were contaminated with VOCs, semi-VOCs, and metals. Groundwater was contaminated with VOCs, semi-VOCs, and metals. Air samples indicated that air contamination was confined to semi-VOCs and metals. The contaminants localized to the respective environment media were somewhat inconsistent from media to media. Few contaminants were found to be associated with all media of concern. Cross media contaminants include Arsenic, Barium, Manganese, Zinc, and Bis(2-ethylhexyl)phthalate. A comparison of surface soil contaminants to sediment/surface water data indicated that migration via overland flow into the tributary system adjacent to the Site area had already occurred. Similarly, air contamination reflected surface soil metal contaminants. Contrarily, groundwater contamination did not agree with surface soil contamination which was understandable since the sub-surface landfill contaminants are the most probable source of groundwater contamination.

10.2 Human Health Risk Evaluation

The risk to human health is determined through the development of exposure and toxicity assessments and the characterization of risk.

10.2.1 Human Health Exposure Assessment

An exposure assessment is an estimation of the magnitude, frequency, duration, and routes of exposure to humans. Exposure contaminants at the Site were assessed in the Baseline Risk Assessment. To this end, exposure was divided into current and future scenarios. The current and future exposure routes consisted solely of a trespasser scenario. Conservative exposure assumptions were developed by the EPA in conducting the assessment.

The current and future soil exposure routes were based on a youth 7-12 years of age. The assumptions included 100 mg/day ingestion rate, exposure frequency of 52 days/year, 6 years exposure duration, a body weight of 27 kg, 3580 cm[2]/day surface area, adherence factor of 0.6 mg/cm2, and absorption factors of 0.01 and 0.001 for organics and inorganics respectively. Similar values were used for surface water and sediment exposure including 100 mg/day ingestion rate, 0.05 1/hr, 2.6 hours/day, and chemical specific K[p]'s. 10.2.2 Human Health Toxicity Assessment

Reference doses (RfDs) have been developed by the EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. The RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help to ensure that the RfDs will not underestimate the potential for adverse non-carcinogenic effects to occur.

The RfDs for the contaminants of concern are included (Appendix C: Table 2).

Cancer Potency Factors (CPFs) have been developed by the EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic

chemicals. CPFs, which are expressed in units of (mg/kg-day)[-1], are multiplied by the estimated intake of a potential carcinogen in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at the intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the CPFs. Use of this approach makes under-estimation of the actual cancer risks highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-animal extrapolation and uncertainty factors have been applied.

The CPFs for the Site's contaminants of concern are included (Appendix C: Table 2).

Although the residential scenario was not applied as a plausible future Site use, the Uptake Biokinetic Model was applied to the Site's lead concentrations to determine the possibility of adverse health effects due to lead exposure. The results indicated that lead contamination levels would not lead to significant predictable blood lead levels in children.

10.2.3 Human Health Risk Characterization

Potential human exposure to site-related contaminants were evaluated via the current and future exposure pathways. Potential exposure was estimated using the conservative assumptions of Site development and exposures in the absence of further remedial measures.

Excess lifetime cancer risks are determined by multiplying the intake level by the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 1 x 10[-6] or 1E[-6]). An excess lifetime cancer risk of 1 x 10[-6] indicates that as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of Site-related exposure to a carcinogen over a 70 year lifetime under the specific exposure conditions at a Site. The EPA considers individual excess cancer risks in the range of 10[-4] to 10[-6] as protective; however, the 10[-6] risk level is generally used as the point of departure for setting clean-up levels at Superfund Sites. Potential concern for non-carcinogenic effects of a single contaminant in a single medium is expressed as the Hazard Quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the HI can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

The cancer risks based on current and future exposure to Site contaminants are included (Appendix C: Table 3). The total risk based on trespasser exposure is 4.5 x 10[-6] which is within the EPA's acceptable risk range of 10[-4] to 10[-6]. The largest portion of the risk was based on surficial exposure to Arochlor 1254 (7.4 x 10[-7]) and outdoor air inhalation 1.3 x 10[6] (Appendix C: Table 4).

The HI, based on the current and future scenario totaled 0.36, which is less than unity (1) (Appendix C: Table 5).

Actual or threatened releases of hazardous substances from this Site do not present an imminent and substantial endangerment to public health or welfare.

10.3 Environmental (Ecological) Risk Evaluation

The risk to the environment is determined through the assessment of potential adverse effects to ecosystems and populations resulting from site related contamination using qualitative methods.

10.3.1 Environmental Exposure Assessment

The exposure assessment identifies species present in the area of risk, based upon the available habitats. The pathways of likely exposure are delineated and those contributing the most potential risk are chosen for inclusion into the Baseline Risk Assessment. The potential magnitude and frequency of exposure to the contaminants of concern can then be calculated for the selected species and pathways using qualitative and/or quantitative methods.

The objectives of the exposure assessment include the identification of habitats, significant pathways/exposure routes, and threatened or endangered species; selection of target species representing exposed organisms (populations and/or communities); and estimation of exposure doses.

The Site encompasses an estimated 102 acres, consisting of a mixed forest and grassland intersected by a series of dirt roads. The Site is divided by Coffee Creek. This creek flows eastward into Eleven Mile Creek, which in turn flows south along the eastern boundary of the Site and eventually empties into Perdido Bay. The main pathways or media of ecological concern are surface soil, surface water, and sediments. For terrestrial biota, the main exposure routes of concern are ingestion of contaminated soils and vegetation by animals and uptake of soil contaminants through plant roots. For aquatic biota, the exposure routes of concern are direct contact with contaminated surface water and sediments and ingestion of aquatic or benthic plants and animals.

Based on available literature, a number of endangered, threatened or otherwise sensitive wildlife species may inhabit portions of the Site. However, none of these species were selected for use in the Baseline Risk Assessment because exposure to these species is expected to be minimal. The target species were divided into two main categories: terrestrial and aquatic. A quantitative method was used to estimate exposure doses for the eastern cottontail (mammal) and the chipping sparrow (bird), representing terrestrial animals; a qualitative exposure assessment was used for the terrestrial plant communities. Qualitative exposure assessments were also used for aquatic biota living in the water column (aquatic community) and those living in or on the bottom sediments (benthic community) (Appendix C: Tables 6 and 7).

Elevated levels of contaminants were found in the surface water and sediments in a swale area located in the southeastern portion of the northern half of the Site. The swale area was not considered to be an aquatic habitat in the Baseline Risk Assessment since it periodically contains water from rainfall.

10.3.2 Environmental Toxicity Assessment

The toxicity assessment characterizes the toxicity of the contaminants of concern. Toxicity values expressed in terms of a dose are used in the assessment of specific receptor species. In the case of community assessments, established state or federal criteria or other media-specific guidelines are used for direct comparison with measured media-specific contaminant concentrations. In the assessment of terrestrial plants, phytotoxicity data expressed in terms of a soil concentration are compared with site specific soil concentrations.

Due to the differences in physiology, toxicity data was not extrapolated between organisms from different phylogenetic classes. Preferentially, toxicity values that represented the highest No Observable Effect Level (NOEL) or the Lowest Observable Effect Level (LOEL) were selected. Data for chronic toxicity were preferentially (in relation to population effects) used, when available, rather than acute or subchronic values since these are reflective of the most sensitive endpoints and effects. Carcinogenic endpoints were not considered in the assessment of toxicity endpoints.

For most contaminants, several data bases and literature sources were reviewed to obtain the

most accurate toxicity value. These studies provide exposure and response data associated with a variety of toxicity endpoints. Specific toxic effects are broadly grouped and listed preferentially (in relation to population effects) as follows: overt effects (organism reproductivity), probable effects (decreased survivability due to alteration in bio-chemical functions of organs) and potential effects (alteration of the organism not readily associated with decreased survivability or longevity).

The Baseline Risk Assessment discusses the application of safety factors (in extrapolating toxicity data from animals other than the target species or from different toxicity endpoints) and the Critical Toxicity Values (CTVs) for the terrestrial species (Appendix C: Tables 8, 9 and 10).

The toxicity of contaminants of concern to aquatic life was assessed by comparing surface water concentrations (average and 95 % upper confidence limit) from Coffee Creek and Eleven Mile Creek to Florida Surface Water Quality Standards and Federal Ambient Water Quality Criteria (AWQC) (both acute and chronic) (Appendix C: Table 11).

Although no sediment specific quality criteria are currently available, the toxicity of contaminants of potential concern identified in Coffee Creek and Eleven Mile Creek to benthic and epibenthic life was primarily assessed by comparison to the National Oceanic and Atmospheric Administration (NOAA) sediment effects and Ontario Ministry of Environment, Water Resources Branch sediment quality values (Appendix C: Table 12).

There is currently no EPA guidance for quantitatively evaluating potential adverse effects to plants growing in contaminated soils. Potential phytotoxicity was addressed qualitatively by comparing soil contaminant concentrations with toxicity values from the literature (Appendix C: Table 13).

The Federal AWQC was established to provide protection of 95 % of all aquatic organisms including plants. Therefore, potential toxicity to aquatic plants is evaluated in the comparison of surface water contaminant concentrations to AWQCs (Appendix C: Table 14).

10.3.3 Environmental Risk Characterization

Risk characterization involves the integration of exposure doses and toxicity information into a quantitative estimation of noncarcinogenic risks. Receptor-specific quantitative risk estimates for the eastern cottontail and the chipping sparrow were calculated for each exposure scenario. Quantitative risk estimates were also calculated for aquatic and benthic communities in Coffee Creek and Eleven Mile Creek. Potential effects to terrestrial plant communities were assessed qualitatively. Risks were calculated individually for each constituent and exposure route.

The quotient method was used to quantitatively assess potential ecological impacts. The quotient method compares exposure doses or concentrations with CTVs to yield a HQ. If the HQ exceeds 1, it indicates that the species of concern may be at risk to an adverse effect from that constituent through that exposure route. Because CTVs incorporate a number of safety factors, if a CTV is exceeded (the HQ exceeds 1), it does not necessarily indicate that an adverse effect will occur.

A cumulative Hazard Index (HI) is calculated by summing HQs across chemicals and/or exposure routes. If the cumulative HI is greater than 1, the total exposure routes may potentially pose a risk for adverse effects to the species of concern. However, as with the HQ, a cumulative HI of greater than 1 does not necessarily indicate that an adverse effect will occur.

During the assessment of surface waters, HQs were not added. The AWQCs give consideration to

all the routes of exposure to aquatic species therefore, different exposure pathways do not need to be added to obtain a total HI. Calculation of a cumulative HI is not appropriate since AWQCs are applicable to only one chemical.

A reasonably conservative strategy was used in the development of the various components of the Baseline Risk Assessment. For example, the lowest reasonable toxicity values were selected when reviewing ecological databases. This approach decreased the likelihood that potential risks will be under-estimated.

Risk estimates for each terrestrial animal receptor (eastern cottontail and chipping sparrow) were calculated based on a "No Action" remedial alternative (Appendix C: Table 15). Exposure for both receptors comes from ingestion of surface soils and vegetation. Potential risks come from metals, Pesticides and Polyaromatic Hydrocarbons (PAHs). For the eastern cottontail, Iron contributed 83 % of the cumulative HI. Aluminum, Aroclor 1254, Iron and PCP collectively contributed 95 % of the cumulative risk. For the chipping sparrow, Dieldrin contributed 69 % of the cumulative HI. Alpha Chlordane, Beta Chlordane, Dieldrin, PCP and Zinc collectively contributed 95 % of the cumulative risk.

These risk estimates must be viewed from the perspective of the Site as a whole. Based upon the low frequency of detection in surface soil samples, the organic contaminants resulting in the greatest risks to the eastern cottontail and the chipping sparrow were present only in limited areas of the Site. Thus, exposure of terrestrial animals to toxic levels of these contaminants would be limited. The inorganic surface soil contaminants were more widespread. Inorganic contaminants were of a greater concern for the eastern cottontail than for the chipping sparrow, since ingestion of soils was the primary exposure route for the eastern cottontail. The ingestion rate used in calculating exposure doses may have over-estimated exposure, since it was based upon data for a rabbit species that lives in a different type of habitat. Also, the background soil concentration for iron (which accounted for the majority of the risk) was the same order of magnitude as the mean surface soil concentration. Thus, the risk for exposure to iron in background soils might be similar to the risk for exposure to iron in on-site soils, with the possible exception of localized areas containing the highest iron concentrations. Finally, the conservative nature of the CTVs used in determining risk may over-estimate the risk to populations. Although contaminants at CTV levels might adversely affect some individuals in a population, the population as a whole might be expected to survive and reproduce. The bio-assessment provided the primary source of data regarding the assessment of potential impacts and/or risks to the aquatic communities of Coffee Creek and Eleven Mile Creek. The potential risk to aquatic and benthic organisms was also quantitatively assessed by comparing ambient water quality criteria and sediment quality standards with media-specific concentrations. Potential risk to aquatic receptors were assessed by comparing media-specific concentrations with surface water quality standards or criteria and sediment quality or effects values. In cases where state specific criteria were absent, AWQC were used.

For the aquatic communities associated with Coffee Creek and Eleven Mile Creek, Cyanide was the only contaminant of concern that had a HQ greater than 1 (Appendix C: Table 11). Cyanide in Eleven Mile Creek was the only contaminant. The average and acute HI 95 % UCL concentrations of Cyanide both exceeded the chronic FSWQS of 5.2 ug/l (HIs of 9.95 and 30.8, respectively). These cyanide concentrations also exceeded the acute AWQS of 22.0 ug/l (HIs of 2.35 and 7.27, respectively). Cyanide was not detected in Coffee Creek.

For the sediment community associated with Coffee Creek and Eleven Mile Creek, sediment concentrations were compared to NOAA sediment effect values (NOAA ER-L and ER-M) and the Ontario sediment quality values (Appendix C: Table 12). No HI exceeded 1 in either mean or UCL concentrations.

For the terrestrial plant community, Alpha-Chlordane, Arsenic, Copper, Dieldrin, Di-N-butylphthalate, Gamma-Chlordane, Lead and Zinc are contaminants of concern. These contaminants exceeded the lowest LOEL concentrations in the Phytotox database. Phytotoxicity information was not available for a number of chemicals of concern; therefore, a complete evaluation could not be made. In addition, phytotoxicity is frequently species-specific and is influenced by many physical and chemical parameters. For example, much of the plant toxicity data used in this risk assessment was based upon studies using agricultural plants, so its applicability to the Site plants is uncertain. As mentioned for terrestrial animals, the organic surface soil contaminants were present at elevated levels only in limited areas, so the areas of possible toxic effects would be limited. Although inorganic surface soil contaminants are more widespread, the available toxicity information indicates that their toxic effects would apparently be limited to some decrease in plant growth or yield.

Actual or threatened releases of hazardous substances from this Site do no present an imminent and substantial endangerment to the environment.

11.0 APPLICABLE, RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

The Baseline Risk Assessment and the comparison of exposure concentrations to chemical-specific standards indicates that there is no unacceptable risk to human health or the environment at the Site.

CERCLA Section 121 clean-up standards for selection of a Superfund remedy, including the requirement to meet Applicable, Relevant and Appropriate Requirements (ARARs), are not triggered at this Site. However, the Florida Department of Environmental Protection (FDEP) has promulgated state closure requirements for municipal and industrial landfills.

12.0 SELECTED REMEDY

The Baseline Risk Assessment and the comparison of exposure concentrations to chemical-specific standards indicates that there is no unacceptable risk to human health or the environment at the Site. Therefore, no action is necessary to ensure protection of human health or the environment. However, the groundwater will be monitored to ensure that this no action remains protective of human health or the environment.

The EPA understands that the Site will be closed by the State of Florida in accordance with the Florida Administrative Code: Chapter 17-701, Solid Waste Management Facilities.

13.0 DOCUMENTATION OF SIGNIFICANT DIFFERENCES

The selected RA alternative as presented in this ROD has no difference, significance or otherwise, from the Proposed Plan.

APPENDIX A
RESPONSIVENESS SUMMARY

The U. S. Environmental Protection Agency (EPA) established a Record of Decision (ROD) public comment period from August 7, 1993 through September 7, 1993 for interested parties to comment on EPA's Proposed Plan for Remedial Action (RA) at the Beulah Landfill Site (Site). The comment period included a public meeting conducted by the EPA on August 17, 1993 at the George Stone Vocational School in Pensacola, Florida. At the public meeting, the EPA presented the results of the Remedial Investigation (RI) and Risk Assessment along with the Proposed Plan (No Action).

A responsiveness summary is required by Section 117 of the Comprehensive Environmental Response, Liability and Compensation Act (CERCLA) 42 U.S.C. 9601 et seq. and Section 300.430(f)(3)(F) of the National Contingency Plan to provide a summary of citizens comments and concerns about the Beulah Landfill Site and the EPA's Proposed Plan, as raised during the public comment period and the EPA's responses to those concerns. All comments summarized in this document have been factored into the final decision concerning the Proposed Plan for RA at the Site.

This responsiveness summary for the Site is divided into the following sections:

I. Overview: this section discusses the Proposed Plan for the Site and the public reaction to this alternative.

II. Background on Community Involvement and Concerns: this section discusses a brief history of community interest and concerns regarding the Site.

III. Summary of Major Questions and Comments Received During the Public Comment Period and the Florida Department of Environmental Protection's (FDEP's) or the EPA's Responses: this section presents both oral and written comments submitted during the public comment period and provides the responses to these comments.

IV. Remaining Concerns: this section discusses community concerns that the EPA should be aware of in the design and implementation of the Proposed Plan for RA at the Site.

I. Overview

The Proposed Plan for RA at the Site was presented to the public in a Fact Sheet released on August 5, 1993 and at a public meeting held on August 17, 1993.

The No Action with groundwater monitoring remedy proposed by the EPA, and selected in the ROD, is considered to be protective of human health or the environment.

Major components of the ROD are as follows:

- no action is necessary to ensure protection of human health or the environment
- the groundwater will be monitored to ensure that this no action remains protective of human health or the environment
- the EPA understands that the State of Florida will close the Site in accordance with the Florida Administrative Code: Chapter 17-701, Solid Waste Management Facilities

II. Background on Community Involvement and Concerns

The Beulah community has lived around the landfill for years and has been aware of the EPA's

efforts to characterize the extent of contamination at the Site.

The EPA Remedial Project Manager and Community Relations Coordinator interviewed members of the community and held a "RI kick-off" meeting prior to beginning the RI. At the meeting, the overall goals of the RI were explained along with basis for the Sampling and Analysis Plan. In addition, the EPA distributed a "RI kick-off" Fact Sheet containing information related to the Site prior to the meeting.

Since that time, the EPA has completed the RI and the Baseline Risk Assessment for the Site. The EPA distributed a "Proposed Plan" Fact Sheet containing information on the RI and the Baseline Risk Assessment along with the Proposed Plan for RA at the Site. The Fact Sheet also announced the public meeting date. At the public meeting, information related to the RI and the Baseline Risk Assessment were presented and questions from the public were answered.

The "key issues and concerns" identified in the public meeting and written comments received by the EPA during the public comment period are presented in Section III.

III. Summary of Major Questions and Comments Received During the Public Comment Period and FDEP's or EPA's Responses

Comment: Mr. Jack Kelly, who attended the Public Meeting and later called the EPA Region IV office during the public comment period, asked about the groundwater flow direction in the southernmost portion of the southern half of the Site. He stated that the true groundwater flow direction is more southeastward than what the RI shows because of the former location of Coffee Creek. The RI shows an eastward flow direction.

Answer: It should be noted that early in the "development" of the landfill, Coffee Creek was re-routed to coincide with the telephone utility easement running between the northern and southern half of the Site. Coffee Creek "originally" traversed the southern half of the Site in a northwest to southeast direction. The original flow direction may have been modified "slightly" by the re-routing of the creek but the groundwater flow directions that exist today are based on the groundwater measurements from on-site wells.

The groundwater monitoring well MW-6, located in the southeast corner of the Site contains Pentachlorophenol (PCP) above Maximum Containment Levels (MCLs). This Record of Decision (ROD) calls for the monitoring of groundwater to ensure that PCP does not migrate off-site. PCP was not found in any of the temporary well samples (TW-1, TW-2 and TW-3) located south of MW-6. If the groundwater flow direction was in a more southeastward direction than that shown in the RI, the temporary well samples would have been in a better position to detect contamination than that of an eastward flow direction.

Comment: Mr. Kelly also asked, in a phone conversation, if the future growth potential of the land northwest of the Site was taken into account in the development of the Baseline Risk Assessment. Mr. Kelly noted that he has plans to develop land northwest of the Site (Quadrants 8,9 and 16) as an industrial park with a reservoir.

Answer: The EPA performed a Baseline Risk Assessment for the Site based on information obtained from the Remedial Investigation (RI). In the assessment, a current tresspasser and future land use scenario was evaluated. These scenarios primarily focus on the Site itself and the land immediately adjacent to the Site. Future land development of areas surrounding the Site are generally not an active part of the assessment. The current tresspasser scenario is the most likely scenario at the Site and was used in the development of the ROD.

Comment: Mr. and Mrs. Welton & Ester Johnson wrote a letter to the EPA Region IV office to

express their concerns as citizens living on Perdido Bay. The Johnsons note that Superfund Sites such as this should not be excavated and mounded above ground creating conditions where contaminants could be blown around or washed away. Their suggestion for this Site is place a fence around it and restrict its usage for anything.

Answer: This ROD calls for no action with monitoring of the groundwater. The EPA understands that the State of Florida will close the Site in accordance with the Florida Administrative Code: Chapter 17-701, Solid Waste Management Facilities. This Code provides the Florida Department of Environmental Protection (FDEP) with the enforcement authority to implement corrective measures. The FDEP will have to determine whether a fence is necessary as part of its Closure Plan.

IV. Remaining Concerns

The EPA is not aware of any remaining concerns associated with the selected remedy.

APPENDIX B

ANALYTICAL DATA SUMMARY TABLES

APPENDIX C

RISK ASSESSMENT TABLES